SSV

IGW/100 Starter Kit: First Steps

The Industrial Gateway IGW/100 Starter Kit contains everything you need to get started to build your safe embedded communication environment via Ethernet technology. The Starter Kit includes a DIL/NetPC ADNP/1520 module with a pre-installed SSV Embedded Gateway Linux inside the IGW/100. The IGW/100 Industrial Gateway with three RJ45 Ethernet interfaces, power supply, serial interface (null modem) cable, a CD-ROM with software and documentation and a printed user manual for the first steps with the Starter Kit.

Figure 1: The Industrial Gateway IGW/100

For using the IGW/100 Starter Kit and the pre-installed SSV Embedded Gateway Linux you need a development system. The minimal configuration for this system is a Windows-based PC with the HyperTerminal terminal emulation program and a free COM port (COM1, COM2 or USB-based COMx) for the RS232 serial link between the ADNP/1520 inside the IGW/100 and HyperTerminal.

For using the Ethernet link, your PC needs an Ethernet adapter with 10 Mbps or 10/100 Mbps LAN interface. This environment allows web server programming (HTML pages, Java Applets) and Linux shell script programming.

For writing ADNP/1520-based Linux application programs you need the GNU C/C++ native tool chain for x86 targets. This tool chain is part of every Linux distribution for PCs. In this case it is necessary to run a Linux O/S on your PC-based development system.

The IGW/100 Starter Kit Key Features

The ADNP/1520 inside of the Industrial Gateway Starter Kit offers a pre-installed Embedded Gateway Linux. This operating system consists of two main components: 1. the Linux kernel and 2. the root file system. The Flash memory also offers a Flash Loader for downloading new versions of the Linux kernel and the root file system. This in-system programming feature can be used by a simple serial and Ethernet link between the development system and the IGW/100.
The IGW/100 offers:

- DIL/NetPC ADNP/1520 with 133 MHz AMD 32-bit SC520 Low Power IA-32 CPU, 64 Mbytes SDRAM and 16 Mbytes Flash

- Embedded Gateway Linux pre-installed in ADNP/1520 Flash memory

- 1 * 10/100 Mbps Ethernet LAN Interface (LAN1: RJ45 Connector)

- 2 * 10 Mbps Ethernet LAN Interface (LAN2, LAN3: RJ45 Connector)

- Reset Switch

- Null- modem cable

- Ethernet Cross-over Cable

- 110 VAC or 230 VAC to 5 VDC International Power Supply

- CD-ROM with User Manual and Hardware/Programmers Manuals

- Embedded Linux with Source

- Remote Login via Linux Serial Console

- Linux Remote Login with Telnet

- Web Server Setup Sample

- Many Source Code Samples

- Power-up Support via E-Mail

1. Step: Cable for the Serial Link between the IGW/100 and a PC

Setup the serial link between the IGW/100 and your PC. Use a null-modem cable for this connection. This cable is part of your Starter Kit.
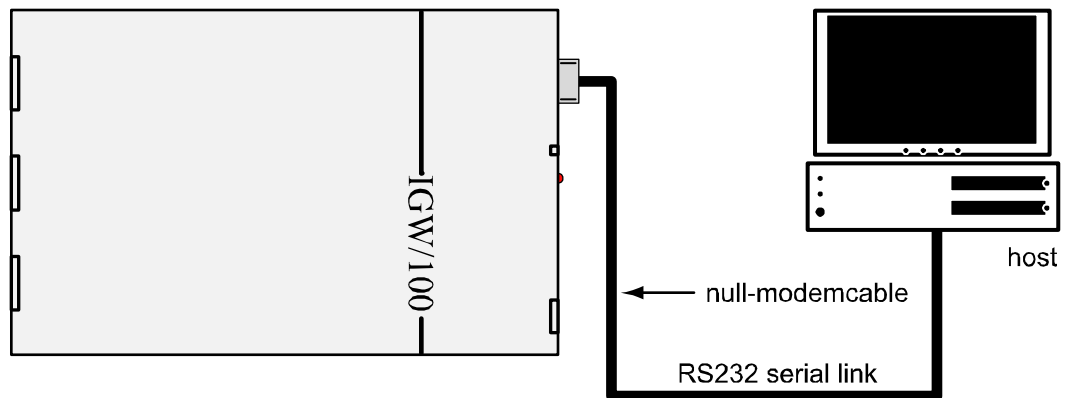
Figure 2: Serial Link between the IGW/100 and the PC

Connect one end of the null modem cable with an unused COM port of your PC. Make sure, that this PC COM port supports 115.200 bps.

2. Step: Cable for the Ethernet Link between the IGW/100 and a PC

Setup the Ethernet LAN link between the LAN 1 port of the IGW/100 and your PC. Use an Ethernet cross-over cable for the first LAN connection. This cable is part of your Starter Kit.
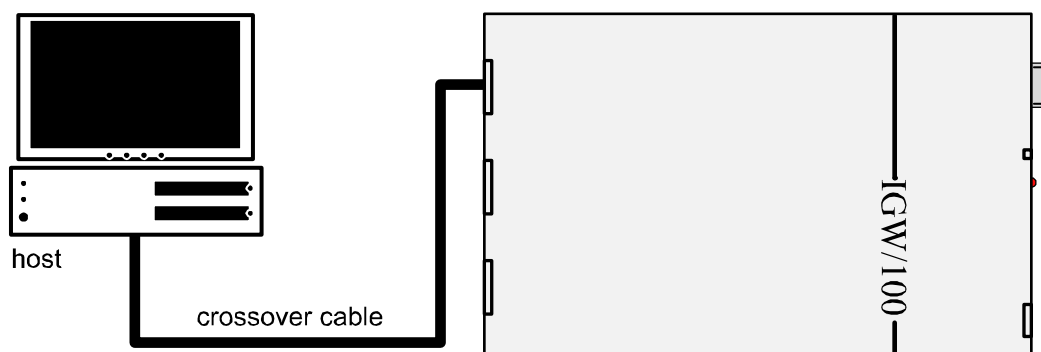
Figure 3: Ethernet Link between the IGW/100 and the PC

Please note: The LAN 1 port of the IGW/100 comes with a default IP address of 192.168.0.126. Please make sure that your PC can work with the IP address range 192.168.0.x.

Ethernet LAN Port	Linux Device Name	Default IP Address
1	eth0	192.168.0.126
2	eth1	192.168.1.126
3	eth2	192.168.2.126

Table 2: Default IP Addresses of the IGW/100 LAN Ports

Please note: The Embedded Gateway Linux is using a DHCP client program for eth0 at boot time. You can supply a valid IP address for this Ethernet interface with a DHCP server.

3. Step: Connect the Power Supply and Power-up the Starter Kit

Connect a 5 VDC power supply to the IGW/100 like shown below. Make sure, that the + voltage is within the center of power supply connector. The 5 VDC power supply is part of your Starter Kit.
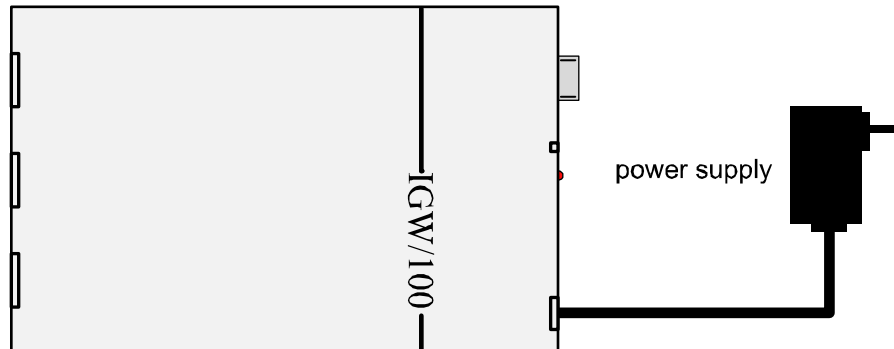
Figure 4: Power supply for the IGW/100

Please note: Make sure, that all cable connections are OK. Then power-up the Starter Kit.

4. Step: Using the Serial Link with a Terminal Program

After you have finished the hardware installation, the remaining configuration is performed through the network. Run *HyperTerminal* on your Windows-PC; please use *minicom* or a similar simple terminal emulation program if you are using a Linux-based PC.

Figure 5: Direct connection setup with *HyperTerminal*

Setup a direct connection with the parameters of table 1. Make sure, that the PC COM port supports 115.200 bps.
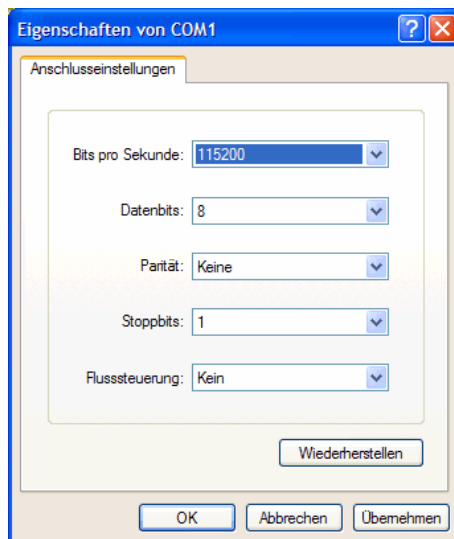
Figure 6: Parameter setup with *HyperTerminal*

Parameter	Value
Speed	115.200 bps
Data Bits	8
Parity	Keine
Stop Bits	1
Protocol	No (Xon/Xoff, RTS/CTS or similar)

Table 2: Setup Parameters for the Serial Link

5. Step: Power-up the IGW/100 without RCM Jumper

Without the RCM jumper, the IGW/100 is booting the Embedded Gateway from Flash memory within some seconds. The first message within the terminal emulation program window is coming up after some seconds from the Embedded Gateway Linux.

Figure 7: Watch the IGW/100 boot process with *HyperTerminal*

The terminal emulation program offers a serial console to the IGW/100 Embedded Gateway Linux. You can enter and execute Linux commands with the terminal emulation program after the boot process finishes and after a login.

Please see the *IGW/100 Hardware Reference* for the exact location of the RCM jumper.

6. Step: Power-up the IGW/100 with RCM Jumper

With the RCM jumper, the IGW/100 is booting the Embedded Gateway from Flash memory within some seconds. The first message within the terminal emulation program window is coming up from the DIL/NetPC ADNP/1520 BIOS.
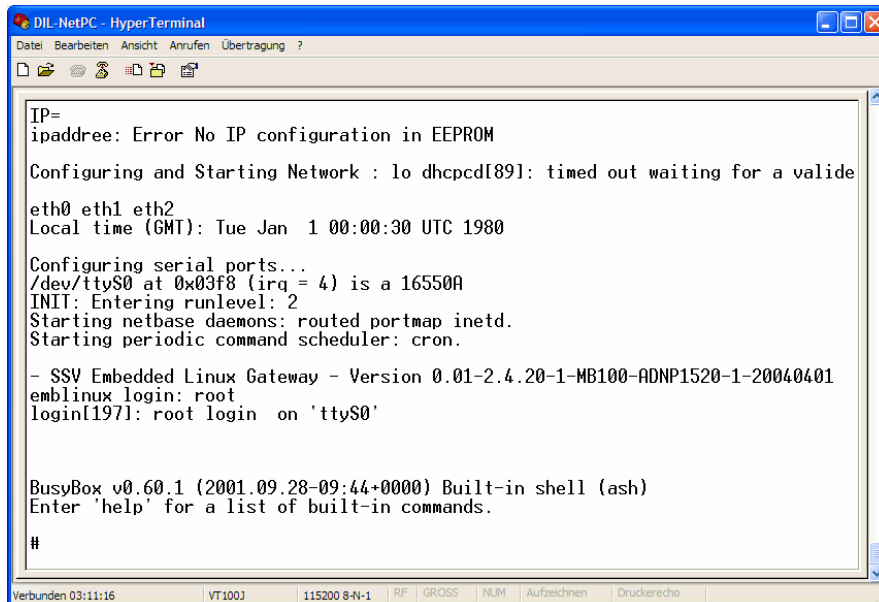

Figure 8: Watch the IGW/100 boot process with *HyperTerminal*

The terminal emulation program offers a serial console to the IGW/100 Embedded Gateway Linux. You can enter and execute Linux commands with the terminal emulation program after the boot process finishes and after a login.

Please see the *IGW/100 Hardware Reference Manual* for the location of the RCM jumper.

7. Step: Remote Login via Linux Serial Console

The IGW/100 offers a serial command line interface via the RS232-based serial link between the IGW/100 and a PC.

Figure 9: Remote Login via Linux Serial Console

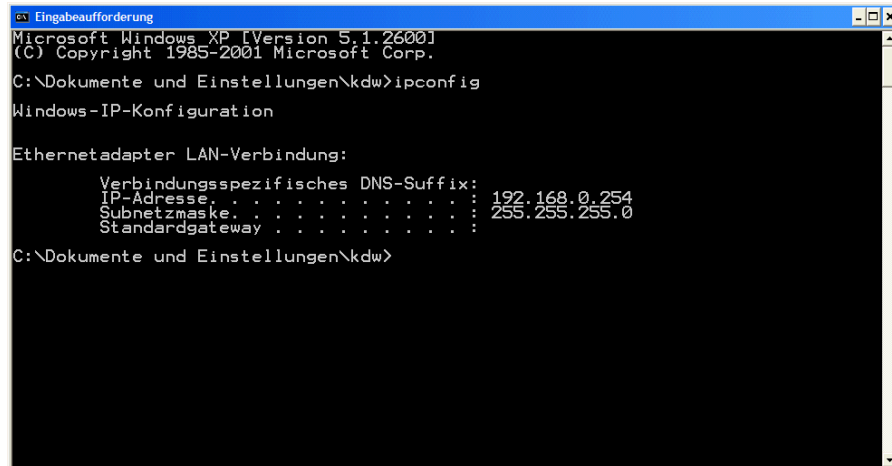Please wait for the login prompt within terminal emulation program window. Then enter the user name

root

and press ENTER. After a login the Linux serial console of the IGW/100 waits for your commands.

Please note: The IGW/100 Embedded Gateway Linux comes with *BusyBox*. All command lines commands are implemented in *BusyBox. BusyBox* combines tiny versions of many common UNIX utilities into a single small executable. It provides replacements for most of the utilities you usually find in GNU *fileutils*, *shellutils*, etc. The utilities in *BusyBox* generally have fewer options than their full-featured GNU cousins; however, the options that are included provide the expected functionality and behave very much like their GNU counterparts. *BusyBox* provides a fairly complete environment for any small or embedded system.

8. Step: Check the IP Address of your PC

Make sure that your PC is using the right IP address for the Ethernet-based TCP/IP communication with the IGW/100. Use the IP addresses 192.168.0.1 or 192.168.0.254 for your PC and 192.168.0.126 for the IGW/100.
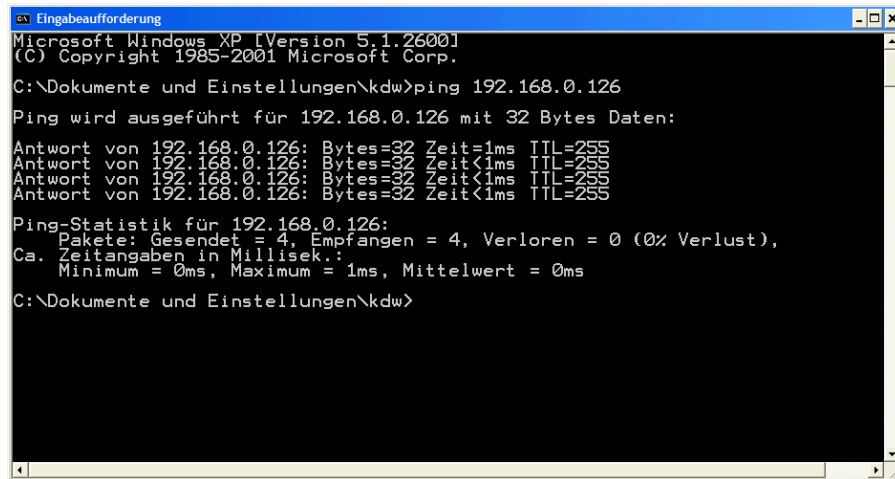
Figure 10: Windows-PC IP address check with *ipconfig*

Talk to your network administrator if you have problems with the IP address understanding.

9. Step: Check the Ethernet-based TCP/IP Communication

Check the Ethernet-based TCP/IP communication between the IGW/100 and the PC with a simple *ping* command.

Figure 11: Windows-PC TCP/IP communication check with *ping*

First check the cable connections and then the IP addresses if your *ping* does not work.

10. Step: Check the IGW/100 Web server

The Embedded Gateway Linux comes with a pre-installed embedded Web server program. Please enter the following HTML lines with the help of the serial command line interface:

```
cd /flash/www
cat > test.html
<html>
<head>
<title>Hello World!</title>
</head>
<body>
<h1> Hello World!</h1>
</body>
</html>
```
CTRL-D   (Stops the Linux cat command)

The Embedded Gateway Linux stores your HTML lines in the DIL/NetPC ADNP/1520 Flash memory. Then run a Web browser program. Enter the URL

http://192.168.0.126/test.html
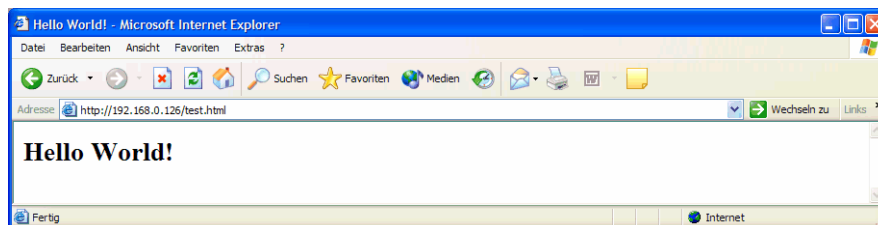
for access the IGW/100 new Web page.

Figure 12: Check the Embedded Webserver with *Internet Explorer*

Please note: The IGW/100 default HTML pages and GIF pictures are also located at */flash/www* in the IGW/100 Flash memory. Please enter the URL

http://192.168.0.126

for access the IGW/100 default Web pages.

11. Step: Using a Telnet Connection

Run a Telnet client program on your PC with the IP address of the IGW/100. You can use a Telnet session for remote entering Embedded Gateway Linux commands. **Please use the user name *root* for logging in.**
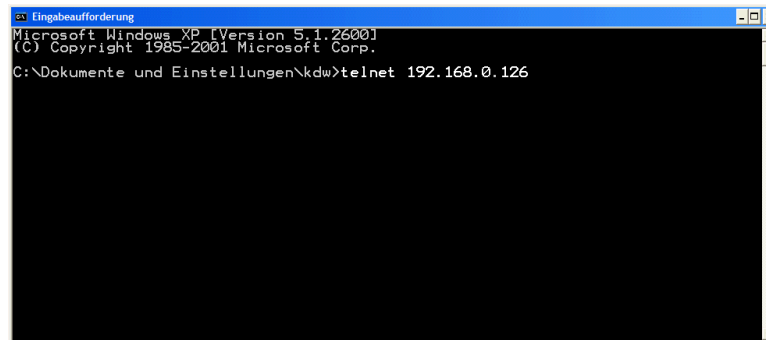
Figure 13: Run the Windows Telnet client program

Please note: The IGW/100 Embedded Gateway Linux comes with *BusyBox*. All command lines commands are implemented in *BusyBox. BusyBox* combines tiny versions of many common UNIX utilities into a single small executable. It provides replacements for most of the utilities you usually find in GNU *fileutils*, *shellutils*, etc. The utilities in *BusyBox* generally have fewer options than their full-featured GNU cousins; however, the options that are included provide the expected functionality and behave very much like their GNU counterparts. *BusyBox* provides a fairly complete environment for any small or embedded system.
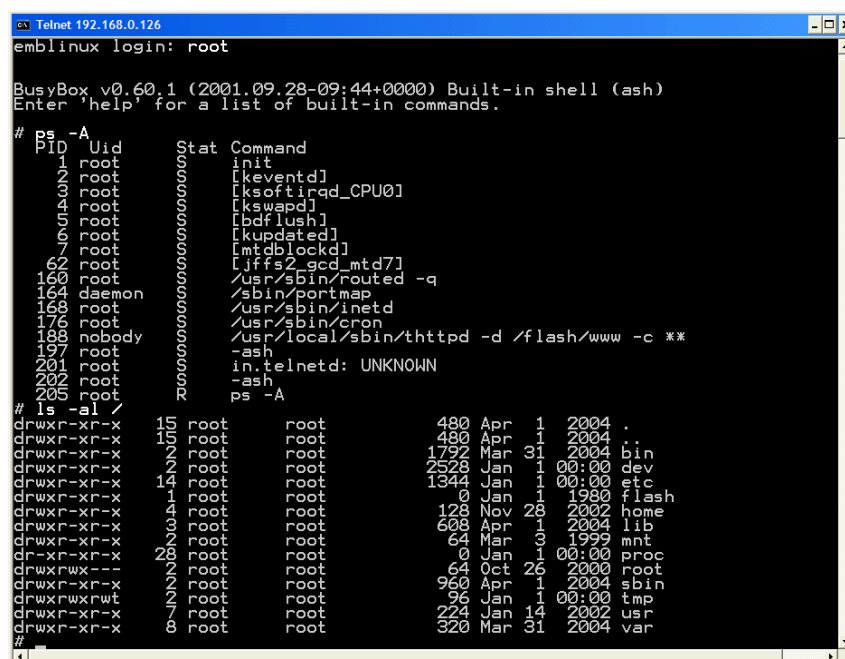
Figure 14: Using Linux commands within a Telnet client window

12. Step: Using a FTP Connection

Run a FTP client program on your PC with the IP address of the IGW/100. You can use a FTP session for file exchange between the IGW/100 and your PC.
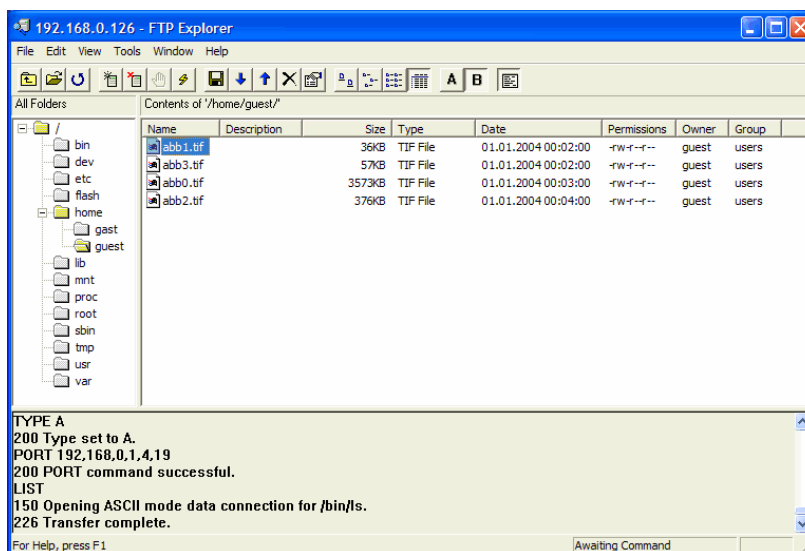

Figure 14: Run a Windows FTP client program

Please use the user name *gast* or *guest* for the FTP logging in. See the following table for valid user names and passwords.

FTP User Name	Password	Home Directory
gast		/home/gast
guest	guest	/home/guest

Table 3: FTP User Names and Passwords

Helpful Literature

IGW/100 Hardware Reference Manual
DIL/NetPC ADNP/1520 Starter Kit User Manual

Contact

SSV Embedded Systems
Heisterbergallee 72
D-30453 Hannover
Phone: +49-(0)511-40000-0
Fax: +49-(0)511-40000-40
e-mail: sales@ist1.de
Web: www.ssv-embedded.de
Web: www.dilnetpc.com

Notes to this Document (IGW/100-FirstStepsE.Doc)

Revision	Date		Name
1.00	07.05.2004	First Version in English (Rev. 1.00)	KDW